Islamic Republic of Iran
Ministry of Jahad-e-Agriculture
National Poplar Commission of Iran

Country Report on poplars and willows

Period: 2012 to 2015
Preface

The I.R of Iran is one of the low forest cover countries, because its forests cover less than 10% of its total land area. Therefore, the main objective of forest policy is to protect forests in natural ecosystem. Forests occupy 12.4 million ha (7.4% of country). From forestry point of view, Iran is divided into five vegetative regions as follows:

- Hyrcanian broadleaves forests along the Caspian coast (Humid forest);
- Arasbaran forests of North Western Iran (semi humid forest);
- Zagros natural forests (semi dry forest)
- Irano-Touranian central forests (Dry mountainous and desert forests)
- Persian Gulf and Sea of Oman (tropical arid forests)

Hyrcanian forests cover 1.2 million ha of land area. They are suitable habitats for a variety of hardwood species such as beech, hornbeam, oak, maple, alder, and other forest tree species including 80 woody species. These forests are known as one of the most basic resources for wood production and have an important role in supplying of raw materials for wood industry.

Iran became a member of IPC in 1953 and then a large number different poplar clones were imported from Italy, Germany, Turkey, Netherland countries from 1965 to 1970. In the first stage, poplar clones planted in a research station of Noshahr (Mazandaran province), Karaj (Alborz province) and Safrabasteh (Gilan province). And in the second stage adaptation experiences carried out on them. With the development of research activities and increase of poplar plantation areas, research programs gradually were expanded in 14 research stations of country.

Today poplar and willow plantations cover some 220000 ha. Approximately 30 percent of these areas are located in North of country along the coastal plain of the Caspian sea and the rest of them are extended at the arid and semi-arid of regions. Poplar clones planted are limited to acclimatized exotic species specifically, *Populus deltoides* and *P. euramericana* clones in coastal plains of the Caspian sea. *Populus nigra* and *P. alba* are planted in arid and semi-arid regions in West and North West and center of country. *P. euphratica* Olive. and *P. caspica* Bornm. are indigenous poplar species of Iran. *Populus caspica* naturally distributed in the three northern provinces (Golestan, Mazandaran, and Guilan). This species can be use for reforestation in degraded forests in plain of Hyrcanian forests. *Populus euphratica* distributed naturally in the vast regions of Iran. It is a native species in arid, semi-arid and desert of the country This species cover 13 provinces of country in the 13 climatic types. Also it has a high tolerance for drought, salinity and alkalinity.

This report has been prepared in collaboration with Research Institute of Frests and Rangelands (RIFR) and Forest, Range and Watershed Management Organization (FRWO)

I. POLICY AND LEGAL FRAMEWORK

Because of environmental services of forests, exploitation of wood decreased in forest management planning. According to this, the state grants substantial support to promote private investment in fast growing tree species plantation (poplar clones), which amount of is increased up to 220000 ha. Wood industries founded its raw materials based on poplar trees. Therefore, for the supply of raw materials for wood industry, one of the main approaches is development of poplar plantations in prone areas of the country.

There are three approaches to supply wood. The first, Harvesting of natural forests, that this is not considerable because environmental services of forests (water and soil conservation and biodiversity) is more important than wood production. The second, imports of wood that because of pest and disease attacks, Wood and wood products imports have had negative impacts on the natural ecosystem. And the third, wood farming in non-forest areas.
Prime strategy for to supply wood is wood production in out of natural forest areas or development of fast growing tree species (poplar) by private and government sectors. Today, climate change, global warming, drought and water shortage are a major constraint to poplar planting, particularly in arid and semi-arid zones. Also site preparation costs are high, and establishment of irrigation facilities very expensive. However the government supports the development of fast growing tree species with drip irrigation system.

**General policies of the poplar plantation development in the country are the following:**
- Increasing poplar plantations area in lands of governmental and private sectors.
- Development of poplar plantations in around of major cities using wastewaters.
- Development of poplar planting on marginal lands with windbreaks. Planting of poplar clones is increased in around of farmlands in the different provinces.
- Increasing the yield per unit area by use of suitable poplar clones in different climatic conditions.
- Reduce of water consumption and promoting irrigation efficiency using drip irrigation systems
- The use of suitable poplar clones with low water requirements and irrigation period.
- Increasing the income of poplar planters by integrated poplar plantation with crops and also shorten the period of harvesting (short rotation system).
- Support and encourage private sector in development of wood farming activities.

II. TECHNICAL INFORMATION

1. Identification, registration and varietal control
Since early 2000, the Research Institute of Forests and Rangelands began Taxonomic identification of species of the genus *Salix*. The first stage, identifying natural habitats in the country and collect herbarium specimens from each of habitats. In the second stage, specimens were planted in the field through cuttings. Willow Species were identified by studying the vegetative and reproductive stages. During this period, identification of willow species was completed and published in a book. Willow species in Iran naturally are located into three vegetation regions (Hyrcaanian, Irano-Touranian and Persian Gulf and Sea of Oman) and many provinces are covered. Overall, willow species of Iran classified in three subgenus and 10 sections (Maassoumi, 2012). List of willow species in Iran as follows:

S. *acmophylla* Boiss.
S. *aegyptiaca* L.
S. *alba* L.
S. *atrocinerea* Brotero
S. *australior* Andersson
S. *babylonica* L.
S. *baladehensis* Maassoumi, Moenii & Rahiminegad
S. *caprea* L.
S. *caucasia* Andersson
S. *caspica* Pallas
S. *caramanica* Bornm. Ex Gröz
S. *cinerea* L.
S. *daviesii* Boiss.
S. *denticulate* Andersson
S. *elbursensis* Boiss.
2. Production Systems and Cultivation

Planted Forests
Poplar clones planted are limited to acclimatized exotic species specifically, *Populus deltoides* and *P. euramericana* clones in coastal plains of the Caspian sea. Poplar plantations in these areas are such as, *P. deltoides* 69.55, *P. deltoides* 77.51, *P. euramericana* I-214, *P. euramericana* 488, *P. euramericana* triplo, *P. euramericana* 561.41, *P. euramericana* costanzo with spacing 3*4 m. Wood production mean of exotic poplar clones is about 30 m³.ha⁻¹.yr⁻¹. In western and center regions (Guilan and Mazandaran provinces) no irrigation, but in the eastern regions (Golestan province) need to be 2-3 times irrigation during the growing season. *Populus nigra* plantation covers more areas in arid and semi-arid regions in West and North West and center of country. Both domestic clones and exotic (Origin of Turkey) are planted in this regions. Wood production of *P. nigra* is 25-30 m³.ha⁻¹.yr⁻¹ with spacing 3*3 , 1.5*2 m. Irrigation system in arid and semi-arid regions is designed as the furrow. *Populus alba* plantations are often native. Wood production of *P. alba* is up to 15 m³.ha⁻¹.yr⁻¹ with spacing 3*3 , 1.5*2 m. Besides, Poplar clones are planted around of farmlands where is main stream for irrigation.

Indigenous Forests
*Populus euphratica* Oliv. and *P. caspica* Bornm. are indigenous poplars in Iran. Natural stands of *P. caspica* that occur in North of Iran distributed throughout plain areas of Hyrcanian Forests. *P. caspica* trees are not easily regenerated because their natural habitats are changed. So there is a serious need for conservation and afforestation of this species. This species is not preferred in plantation programmes in the plain areas of North country.

*Populus euphratica* distributed naturally in the vast regions of Iran. This species cover 13 provinces of country in the 11 climatic types. Also it has a high tolerance for drought, salinity and alkalinity. This climatic were arid, semi-arid and desert with temperate, cold and very
cold winter. Soil texture is sandy, sandy loam and loam. The electrical conductivity (EC) value ranged from 1< up to 30 mS.cm⁻¹ and pH value ranged from 7.3-8.8.

**Agroforestry and Trees Outside Forest**

*Populus deltoides* and *P. euramericana* are planted extensively in agroforestry fields in the East coastal plains of the Caspian sea (Golestan province). Poplar clones are planted on field boundaries where is main stream for irrigation.

*Populus nigra* is planted only in irrigated lands in West and North West of country (Western Azarbaijan) by farmers. In these regions, agricultural crops such as wheat and alfalfa are grown in the inter-spaces.

Study of performance of alfalfa under various spacing of poplar (*P. nigra* and *P. alba*) showed that increase in distance between tree rows resulted higher growth in diameter at breast height (dbh) and height of tree and yield dry matter in alfalfa crop (Asadi *et al.*, 2012).

In arid and semi-arid areas that are irrigated farms, intercropping of tomato, pepper, cucumbers etc. crops between rows of cultivated poplar (*P. nigra*) to provide increase the farm returns.

3. **Genetics, Conservation and Improvement**

**Leuce section**

*P. caspica* is an endangered, endemic tree species that distributed in the plain areas of Hyrcanian Forests. Identify natural habitats and collecting of germplasm resources is very important for developing, conservation and rehabilitation strategy.

*P. caspica* trees yearly disperse plentiful of short-lived tiny seeds that need the suitable conditions and substrates to germinate and grow. Usually, the required conditions are not available in its natural habitats. Therefore, its regeneration and genetic diversity has limited. The study stared with the selection and vegetative propagation of adult trees. The selection carried out on 25 single trees, distributed at different sites in Golestan, Mazandaran, and Guilan provinces. Then germplasm collection consists of different seedlings was established in the Research station of Chamestan (Mazandaran province).

**Turanga section**

The preserving of the genetic resources of *Populus euphratica* through the ‘ex situ’ method started with identifies natural habitats, selection and vegetative propagation of adult trees. In this regard, identification of natural *P. euphratica* habitats in the country was conducted. Then establishment of germplasm collection from different sites. The aim study was identifying and selection of superior phenotypes of *P. euphratica* and seed propagation for new genotypes and also selection of elite genotypes by evaluation of growth rate and stem from traits. A total of 29 superior trees from 13 natural stands were selected. Seedlings produced by seed culture in greenhouse condition. Evaluation of seedlings was performed in a nursery of Karaj research station (RIFR) during 2011 to 2013. Results showed the diameter mean in progenies of the superior trees of Kerman and Khojir, also height mean in progenies of the Kerman, Khojir, Ahvaz and Zabol the most growth values.

Interspecific hybridization was performed between the two species of *P. euphratica* and *P. alba* to achieve superior progenies. *P. alba* and *P. euphratica* trees are native poplar species of Iran. *P. alba* for adaptability, wood production and straightness of stem form and *P. euphratica* for resistance of drought and salinity was chosen as parental species in poplar breeding.

The initial results, also indicated tolerance to water and soil salinity and alkalinity. The researchers are going to introduce a few high yielding hybrid clones which tolerance to saline conditions.
4. Forest Protection

5. Harvesting and Utilization

6. Environmental Applications
Evacuation of urban and industrial wastewater have harmful effects on environment especially farmlands irrigated with them. Population growth in large cities (Tehran) will generate a lot of wastewater. Agricultural lands South of Tehran accepting a large amount of urban wastewater that is not suitable for cultivation of crops. In this regard, poplar plantation development program instead of agriculture crops was carried in 2014. This program was started with planting of 30 hectares as pilot. In this region *P. nigra* plantation was planted with spacing of 2 x 1.5 m in lands of private sector. As well as rooted cuttings was given to farmers as free of charge by govermental sector. Preliminary results showed that poplar trees had high diameter and height growth.

Heavy metal absorption in some species of *Salix*
In a research work, three species of *Salix alba*, *S. acmophylla* and *S. fragilis* were considered as phytoremediation trees. A thirty Km area from north to south of Tehran was selected for sampling. Samples were collected from leaves of *Salix* trees, irrigation water and soils. Results showed that *Salix* can accumulate cadmium and zinc. Therefore *Salix* trees were considered to reduce heavy metals from environmental pollution. The next experiment was investigation based on cadmium, lead, copper and zinc accumulation by young trees of the three *Salix* species. With regard to poisonous range and matal absorption, all 3 species can accumulate Zn and Cd, *S. alba* and *S. fragilis* with more Pb accumulation and *S. acmophylla* with more Cu absorption were more effective. So these beautiful tree species are very useful for urban green space.

III. GENERAL INFORMATION

1. Administration and Operation of the National Poplar Commission or equivalent Organization
National Poplar Committee (NPC) consists of 27 members. It is composed of members from government sectors, research, university, poplar planters, wood industries and insurance and is responsible to follow up the implementation of proposals for action at national level. The NPC will hold a public meeting twice a year and examines the issues and problems related to poplar plantation in country. The committee consists of various sub-committees with topic issues including production systems, Genetics, conservation and improvement, harvesting and utilization of wood, insect, pests and diseases and social economy aspects.

2. Literatures


**IV. SUMMARY STATISTICS (Questionnaire)**
Completed questionnaire at the end of report is attached
**QUESTIONNAIRE ON POPLARS AND WILLOWS**  
**2012-2015**

**INTRODUCTION**

The questionnaire on poplars and willows is designed to complement the Country Reports for the 25th Session of the International Poplar Commission (IPC) in 2016.

Response to the questionnaire is crucial for FAO to allow country, regional and global analyses of status and trends in forest sector development and to assist in improving formulation of policies, preparing outlook studies and undertaking planning, management, monitoring and reporting.

The questionnaire has only 4 questions. We understand the difficulties that experts may find in providing such information, however in lack of detailed statistical data, aggregated data and/or best professional estimates are also very much appreciated.

**CONTACTS**

For queries in completing this questionnaire, please contact:

Mr. Walter Kollert, IPC-Secretary, [walter.kollert@fao.org](mailto:walter.kollert@fao.org), or IPC-Secretariat, [IPC-Secretariat@fao.org](mailto:IPC-Secretariat@fao.org),

**Thank you very much for your cooperation !**

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We would appreciate your contact details in case we may have any queries

<table>
<thead>
<tr>
<th>Country</th>
<th>Iran</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Contact person</strong></td>
<td>Mohsen Calagari</td>
</tr>
<tr>
<td><strong>Position of contact person:</strong></td>
<td>Head of poplar Division, Research Institute of Forests and Rangelands</td>
</tr>
<tr>
<td><strong>E-mail:</strong></td>
<td><a href="mailto:calagari@rifr-ac.ir">calagari@rifr-ac.ir</a></td>
</tr>
<tr>
<td><strong>Telephone:</strong></td>
<td>+98 21 44787282-5</td>
</tr>
</tbody>
</table>
**Question 1: Total area of poplars and willows 2015 and area planted from 2012 to 2015 (area change over the last 4 years)**

The main FAO forest categories can be classified as:

<table>
<thead>
<tr>
<th>Forest category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Indigenous forest</strong></td>
<td>forest of native species, where there are no clearly visible indications of human activities</td>
</tr>
<tr>
<td><strong>Planted forest</strong></td>
<td>forest of native species, or of introduced species, established through planting or seeding mainly for production of wood or non-wood goods and/or provision of environmental services</td>
</tr>
<tr>
<td><strong>Agroforestry/trees outside forests (TOF):</strong></td>
<td>Stands smaller than 0.5 ha; trees in agricultural land (agroforestry systems, homegardens, orchards); trees in urban environments; and scattered along roads and in landscapes</td>
</tr>
</tbody>
</table>

In the following table, please indicate for the year 2015 the area (ha) of poplars and willows, the forest area allocated to forest functions (%) and the area planted (afforestation and reforestation) from 2012 to 2015 (4 years).

Please note that the total of the four forest functions cannot be more than 100% horizontally.

<table>
<thead>
<tr>
<th>Forest category</th>
<th>Total Area 2015 (ha)</th>
<th>Total area by forest function in %</th>
<th>Area planted from 2012-2015 (reforestation + afforestation) (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Indigenous</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poplars</td>
<td>30000</td>
<td>5 90 5</td>
<td></td>
</tr>
<tr>
<td>Willows</td>
<td>15000</td>
<td>10 10 70 10</td>
<td></td>
</tr>
<tr>
<td>Mix of P&amp;W Total</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Planted</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poplars</td>
<td>140000</td>
<td>100</td>
<td>50000</td>
</tr>
<tr>
<td>Willows</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mix of P&amp;W Total</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Agrofor/TOF</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poplars</td>
<td>80000</td>
<td>95 5 20000</td>
<td></td>
</tr>
<tr>
<td>Willows</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mix of P&amp;W Total</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grand Total</td>
<td>265000</td>
<td></td>
<td>70000</td>
</tr>
</tbody>
</table>
**Question 2: Wood removals in 2015**

Please quantify by forest category, species and/or cultivar the wood removals in cubic meter (m³) of each respective product. If possible group the total removals according to industrial roundwood and fuelwood/wood chips.

<table>
<thead>
<tr>
<th>Forest category and species, cultivar or clone</th>
<th>Wood removals 2015 in m³</th>
<th>for industrial roundwood</th>
<th>for fuelwood, wood chips</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indigenous Poplars</td>
<td>Total removals</td>
<td>Veneer/plywood</td>
<td>Pulpwood</td>
</tr>
<tr>
<td>P. euphratica</td>
<td>10000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P. caspica Bornn.</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indigenous Willows</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S. excelsa</td>
<td>10000</td>
<td>5000</td>
<td>5000</td>
</tr>
<tr>
<td>S. alba</td>
<td>5000</td>
<td>3000</td>
<td>2000</td>
</tr>
<tr>
<td>Planted Poplars</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P. deltoides</td>
<td>1200000</td>
<td>1050000</td>
<td>150000</td>
</tr>
<tr>
<td>P. euramericana</td>
<td>700000</td>
<td>600000</td>
<td>100000</td>
</tr>
<tr>
<td>P. alba</td>
<td>450000</td>
<td>370000</td>
<td>80000</td>
</tr>
<tr>
<td>P. nigra</td>
<td>2800000</td>
<td>2400000</td>
<td>400000</td>
</tr>
<tr>
<td>Willows</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grand Total</td>
<td>5175000</td>
<td>4428000</td>
<td>730000</td>
</tr>
</tbody>
</table>
**Question 3: Forest products from poplars and willows 2015**

Please list by forest category the products that have been produced from poplars and willows in 2015. Please use **roundwood equivalents (1000 m$^3$ r)** as measuring unit. The general conversion factors for each single product are given below (in case your country specific conversion factors are not available):

<table>
<thead>
<tr>
<th>Product</th>
<th>Measuring unit of the product</th>
<th>Conversion factor to roundwood equivalents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuelwood</td>
<td>metric tonnes or m$^3$ stacked wood</td>
<td>1 metric tonne = 4 m$^3$ (r)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 m$^3$ stacked wood = 1.8 m$^3$ (r)</td>
</tr>
<tr>
<td>Chips</td>
<td>metric tonnes</td>
<td>1 metric tonne = 1.7 m$^3$ (r)</td>
</tr>
<tr>
<td>Mechanical wood pulp</td>
<td>metric tonnes</td>
<td>1 tonne mech. pulp = 2.5 m$^3$ (r)</td>
</tr>
<tr>
<td>Chemical wood pulp</td>
<td></td>
<td>1 tonne chem. pulp = 4.5 m$^3$ (r)</td>
</tr>
<tr>
<td>Particleboard</td>
<td>m$^3$ of the product</td>
<td>1 m$^3$ particleboard = 1.4 m$^3$ (r)</td>
</tr>
<tr>
<td>Fibreboard (hardboard, MDF)</td>
<td></td>
<td>1 m$^3$ fibreboard = 2.0 m$^3$ (r)</td>
</tr>
<tr>
<td>Veneer sheets</td>
<td>m$^3$ of the product</td>
<td>1 m$^3$ = 1.9 m$^3$ (r)</td>
</tr>
<tr>
<td>Plywood</td>
<td>m$^3$ of the product</td>
<td>1 m$^3$ = 2.5 m$^3$ (r)</td>
</tr>
<tr>
<td>Sawn timber</td>
<td>m$^3$ of the product</td>
<td>1 m$^3$ = 1.8 m$^3$ (r)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Forest category</th>
<th>Fuelwood</th>
<th>Chips</th>
<th>Industrial roundwood</th>
<th>Wood-pulp</th>
<th>Particleboard</th>
<th>Vener sheets</th>
<th>Plywood</th>
<th>Sawnwood</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indigenous</td>
<td></td>
<td></td>
<td>(logs, pulpwood)</td>
<td>(mech. or chem.)</td>
<td>(MDF, hardboard)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>From poplars</td>
<td>5</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>From willows</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planted</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>From poplars</td>
<td>350</td>
<td>548</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2370</td>
<td>380</td>
</tr>
<tr>
<td>From willows</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agrofor. TOF</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>From poplars</td>
<td>150</td>
<td>225</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>975</td>
<td>150</td>
</tr>
<tr>
<td>From willows</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
Question 4: Your opinion is important to us! Please reflect on the prevailing trends until 2030 in the development of poplars and willows in your country!

What is your opinion on the following issues?

Please put a cross in the column you think most appropriate

| 1. The conversion of **natural** poplar and willow forests to other land uses will... | increase | decrease | remain as it is | don’t know |
| 2. The area of **planted** poplar and willow forests will... | + | | |
| 3. The area of poplars and willows for bioenergy plantations will ... | | + | |
| 4. Government investments in the poplar and willow sector will ... | + | | |
| 5. Private investments in the poplar and willow sector will ... | + | | |
| 6. The significance of poplars and willows for **productive** purposes will ... | + | | |
| 7. The significance of poplars and willows for **environmental** purposes will... | | + | |
| 8. The rejection by environmental groups of **planted** poplar and willow forests will... | | | + |
| 9. The **acceptance** by the general public of poplars and willows being important natural resources will........ | + | | |

---END OF QUESTIONNAIRE---